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ABSTRACT

In a study of the effects of an anticipated reward on the interaction between rewarder and rewardee, the hypothesis was advanced that the offer of a reward heightens a child's sense of outerdirectedness and dependency upon the rewarding adult. Twenty-nine preschoolers who had demonstrated some intrinsic interest in puzzles were asked to assemble a pair of puzzles under one of two conditions, reward promised (RP) or no reward promised (NRP). As predicted, children in the RP condition verbalized more often and glanced at the experimenter more than did children in the NRP condition. In addition, although treatment group differences in quality of puzzle performance and in subsequent interest in puzzles did not attain statistical significance, both measures showed significant negative correlations with number of verbalizations among children in the RP condition. This finding suggests that the promise of reward per se may not inevitably undermine intrinsic motivation and task performance; instead, such undermining effects may depend upon the impact of the reward on the interaction between rewarded child and rewarding adult. (Author/JMB)

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# Extrinsic Rewards, Intrinsic Motivation, and Task Performance: The Mediating Role of Social Interaction

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## Abstract

In a study of the effects of an anticipated reward on the interaction between rewarder and rewardee, the hypothesis was advanced that the offer of a reward heightens a child's sense of outerdirectedness and dependency upon the rewarding adult. Twenty-nine preschoolers who had demonstrated some intrinsic interest in puzzles were asked to assemble a pair of puzzles under one of two conditions, reward promised (RP) or no reward promised (NRP). As predicted, children in the RP condition verbalized more often and glanced at the experimenter more than did children in the NRP condition. In addition, although treatment group differences in quality of puzzle performance and in subsequent interest in puzzles did not attain statistical significance, both measures showed significant negative correlations with number of verbalizations among children in the RP condition. This finding suggests that the extent to which reward procedures undermine intrinsic motivation and task performance may be a function of the impact of rewards upon the social orientation of the rewarded individual.

Paper presented at the biennial convention of the Society for Research in Child Development, New Orleans, Louisiana, March, 1977.

# Extrinsic Rewards, Intrinsic Motivation, and Task Performance: The Mediating Role of Social Interaction

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One of the most important developments in the study of motivation is the recent line of evidence indicating that task-extrinsic rewards used to promote task performance may, in certain conditions, have adverse effects on both performance on and subsequent interest in the task (cf. Condry, in press; McGraw & McCullers, 1975). Paradigmatic of the research on interest is the frequently cited study by Lepper, Greene, and Nisbett (1973). In this experiment children who had shown substantial intrinsic interest in drawing activity were divided into three treatment groups. The three groups, matched for initial interest in drawing, all drew in the presence of the experimenter, but one group was promised a reward in exchange for drawing, a second group received an unanticipated reward after drawing, and the third group was neither promised nor given a reward. Subsequent observations revealed that the group which had contracted for reward spent significantly less free-play time at drawing activity than children in the other two groups. This general finding that groups contracting for reward show less subsequent interest in target activities than other groups of high initial interest that do not contract for reward, has been replicated in a number of studies that differ from Lepper et al. (1973) in both age of subjects (e.g., Deci, 1972)[1] and nature of target activity (e.g., Ross, 1975).

The interpretation of these findings on intrinsic interest has been the subject of considerable controversy in recent years. One set of interpretations has theoretical roots in the work of Berlyne (e.g., 1958), Hunt (1965), and White (1959) on intrinsic motivation, and the work of the dissonance

(e.g., Festinger & Carlsmith, 1959) and self-perception (e.g., Bem, 1972) theorists on the effects of extrinsic reward on attitudes and inferences about one's own motivation. Emerging from this tradition are the "overjustification hypothesis" (Lepper et al., 1973), "endogenous attribution theory" (Kruglanski, 1975), and "cognitive evaluation theory" (Deci, 1972)--all of which focus upon hypothesized effects of rewards on individuals' judgments as to the causes of their behavior. Lepper and his colleagues (Lepper et al., 1973; Lepper & Greene, 1976), for example, argue that the expectation of extrinsic gain leads one to infer that his or her activity is motivated by a desire for that extrinsic gain rather than by intrinsic interest in the activity itself. Consequently, when the possibility of extrinsic gain is withdrawn, the individual is less likely to engage in the activity, because it is perceived as relatively uninteresting intrinsically. The general class of explanations represented by Lepper et al., Kruglanski, and Deci, will herein be labeled the reattribution hypothesis.

Aligned against the reattribution hypothesis is the competing response hypothesis (Child & Waterhouse, 1952; Reiss & Sushinsky, 1975, 1976). This general hypothesis (which subsumes several specific "distraction" hypotheses, to be cited later) derives in part from that component of the learning theory tradition which holds that the affective consequences of engaging in an activity will determine subsequent motivation for that activity (see Brown & Farber, 1968; Farber, 1955). Reiss and Sushinsky (1975, 1976) have argued that the introduction of an expected reward leads, not to reattribution of the cause of one's task performance, but instead to responses which compete with task enjoyment--responses such as anxiety, hurried performance (in an effort to get the reward quickly), and "visual or cognitive distraction (looking at or thinking about the reward at

the expense of enjoying the activity) (1976, p. 235)." To the extent that such competing responses are activated, the hypothesis holds, intrinsic motivation will be undermined via aversive respondent conditioning, recognition of a failure to enjoy the task, or recognition of poor performance on the task.

In addition to their effects on intrinsic interest, extrinsic rewards have been shown under certain conditions to undermine quality of task performance. While such undermining effects have been found most consistently with trial-by-trial reward procedures (see review by McGraw & McCullers, 1975), a number of studies report poorer task performance under single-trial anticipated reward conditions like that of Lepper et al. (1973) (see Condry & Chambers, in press; Kruglanski, Friedman & Zeevi, 1971; Lepper et al., 1973; Terrell, 1958; Weick, 1964). Among explanations for the undermining effects of rewards on performance quality it is again possible to identify outgrowths of the general reattribution (Kruglanski, 1975; Kruglanski et al., 1971; Weick, 1964) and competing response (McGraw & McCullers, 1975; Miller & Estes, 1961; Spence, 1971; Reiss & Sushinsky, 1975, 1976) hypotheses (although the two positions appear less distinct conceptually in this context than in discussion of intrinsic interest). As an example of the former, Kruglanski and his colleagues (Kruglanski, 1975; Kruglanski et al., 1971) have developed an "endogenous attribution theory" which holds, in part, that an anticipated reward induces the perception that one is performing for the goal of reward, which in turn induces "shrinkage" in the number of task elements attended to (i.e., to only those elements seen as critical to attainment of the reward). The more numerous examples of the competing response hypothesis generally hold that some aspect of the reward situation (most often looking at or thinking about the reward) distracts the subject from the task itself, thus interfering with his or her performance.

In research bearing on the reattribution and competing response hypotheses with regard to both intrinsic interest and task performance, there is a rather surprising gap. In reviewing the literature a reader is hard-pressed to find information about the role of social interaction in the reward situation. This is surprising because information on the rewarded individual's social behavior vis-a-vis the rewarding individual might contribute to both the reattribution and competing response positions. With regard to the former, for example, it is possible that a rewarded child reattributes his or her behavior, not in (or not only in) the form, "I am performing the task for reward," but rather in the form, "I am performing the task for this (generous) adult who is giving me a reward." The shift from the first attribution to the second, while clearly rather subtle in nature, would represent no minor theoretical shift, because it would imply that interest and/or performance quality are undermined, not because task activity is perceived as instrumental or motivated by desire for extrinsic gain, but because it is perceived as being performed out of a sense of obligation or dependency.

Examination of social behavior might also suggest certain refinements in the competing response hypothesis. For example, it may be that a distracting effect of anticipated rewards inheres, not in (or not only in) the reward object itself, but rather in the relatively unfamiliar individual who has the power to dispense (or withhold--should he or she prove untrustworthy) the reward.

In the body of research reviewed above, perhaps the closest approach to the study of social factors has been that of Lepper and Greene (1975). Their study was an attempt to assess the effects of "adult surveillance" on children's intrinsic interest; however, in an effort to control the amount of perceived surveillance and to minimize the influence of "concurrent feedback to the child concerning his performance or interaction between the subject and the experimenter" (1975, p. 481),

Lepper and Greene employed a television camera, rather than a proximate adult, as the agent of direct surveillance. While such an approach is justifiable on certain methodological grounds, it risks overlooking what may be an extremely important feature of the rewarded child's experience--i.e., the effects of rewards on the child's social orientation.

That the social aspect of the child's experience may bear an important relationship to his interest in and performance on a task is suggested by several relatively distinct lines of empirical and theoretical work. Ruble and Nakamura (1972) have distinguished between "social orientation" and "task orientation" in children attempting a problem-solving task in the presence of an adult. Other investigators have discussed similar distinctions using the terms, "emotional" vs. "instrumental" (Heathers, 1955), "person-oriented" vs. "task-oriented" (Bandura & Walters, 1963), and "dependency" vs. "autonomous achievement striving" (Beller, Adler, Newcomer & Young, 1972). Explicit or implicit within each of these distinctions is a general model which denies the additivity of social orientation and task orientation (to use what seem to be the broadest generic terms of the four available pairs). This model implies that in many conditions, heightening a child's social orientation will tend to drain either motivational energy or attention from the child's task orientation.

Following this tradition, the present research was fashioned around the general hypothesis that the prospect of receiving a reward from another individual for one's task performance is one of those factors which can heighten social orientation (vis-a-vis the agent of reward) to the detriment of task orientation. More specifically, the two-part hypothesis was advanced that when an adult offers a child a reward, (a) the child's social orientation is heightened (due, in part, to an increased sense of outerdirectedness and dependency upon the rewarding adult),

and (b) heightened social orientation in reward conditions is accompanied by decrements in task orientation, with concomitant undermining of both performance on, and subsequent interest in, the task itself. The hypothesis was stated in a rather general form, susceptible of interpretation (should the data support it) in terms of process variables from either the reattribution or the competing response position. This approach was deemed most appropriate since the present research was not designed to pit the two theoretical positions against one another, but instead to determine whether social factors might mediate those findings which proponents of both positions acknowledge.

The target activity in the present research was puzzle assembly. Children who had displayed some intrinsic interest in puzzles during naturalistic observations were asked to assemble two novel puzzles in the presence of an adult experimenter. Half of the children were promised a reward, while for the remainder no reward was mentioned. Social orientation was operationally defined in terms of number of verbalizations (following Vygotsky [1962] and Piaget [1962]) and glances at the experimenter (following Achenbach and Weisz [1975] and Ruble and Nakamura [1972] ) by the child during the experimental session. Hypothesis a (above) led to the prediction that children promised a reward would verbalize and glance at the experimenter more than children not promised a reward. Hypothesis b (above) led to the prediction that among children in the reward group glancing and verbalizing would be inversely related to both quality of performance on the experimental puzzles and subsequent interest in puzzles during naturalistic observations.

## Method

### Subject Selection

Subjects were selected by means of a procedure similar to that of Lepper et al. (1973). Two observers equipped with Rustrak eight-track event recorders, and

stationed behind one-way observation windows, observed children at free-play in the Cornell Nursery School for one-hour periods on five consecutive days. In addition to numerous other activities available to the children, a hexagonal table near the observation window contained six preschool puzzles (Playschool and Laurie brands) which had not been available in the Nursery School prior to this experiment (and all other puzzles had been removed from the play areas). The observers recorded the amount of time each of the 44 available children spent examining or playing with one of the puzzles. Each observer recorded such activity at four of the six triangular segments of the hexagonal table. Observer overlap on two of the table segments permitted assessment of inter-observer reliability; the correlation between observers was .98.

Because a number of the children were absent from the nursery school during portions of the observational time, the time spent with puzzles was calculated as a percentage of time present. Children were designated as having displayed some intrinsic interest if they had spent as much as one percent of their time with the puzzles. Using this criterion, 29 children were selected for inclusion in the experiment. The 29 were grouped by class (morning vs. afternoon group) and ranked in order to total playing time. Within each class, pairs of children having adjoining ranks were randomly assigned to alternate treatment conditions--Reward Promised (RP) or No Reward Promised (NRP)--with one child first chosen at random for the RP condition (since there was an odd number of subjects). The NRP group contained seven girls and seven boys (age range: 35-61 months, mean = 48.3). The RP group contained nine girls and six boys (age range: 34-57 months, mean = 48.9). Groups did not differ significantly in age, in Hollingshead (1957) socioeconomic status level, or in the log transformed (see Results below for rationale) proportion of their time spent with puzzles during baseline observations.

About one week after the fifth observation period, a female experimenter (#1) known to each of the children, and unacquainted with the purposes of the study,

met each child individually in the nursery school play area and asked the child to accompany her to try some new puzzles with a friend. On their way to the experimental room with children in the RP condition, Experimenter 1 showed the child a 7½ x 12½ cm "Good Player Award" (designed by Harter, 1967) and said that after the child had finished the puzzles, the "friend" (Experimenter #2) would give the child this prize. On arrival at the experimental room, Experimenter 1 introduced the child to Experimenter 2 (who was also unfamiliar with the purposes of the study), and departed. Experimenter 2 then showed the child two disassembled puzzles, and said:

> "Did my friend, (Experimenter 1's name), tell you that you can win this prize (showing the Good Player Award) for doing these puzzles with me? When you do these puzzles you will get this prize. Okay?"

The children all agreed, most of them eagerly. Then the experimenter administered the two puzzles, designed by Achenbach and Weisz (1975) for use with preschoolers. Puzzle 1 consisted of a 17-cm square, constructed of 0.6-cm-thick Masonite, painted blue, and cut into four pieces. It was placed in a 1.2-cm-thick Masonite frame measuring 24.2 x 20 cm. Puzzle 2 consisted of a Masonite circle 17.4 cm in diameter and 0.6 cm thick, cut into four pieces, painted yellow, and set into a recessed frame like that of puzzle 1.

Sitting beside the subject, experimenter 2 said:

> "Here are some pieces of a puzzle. I want you to put them together as quickly as you can. While you are putting yours together, I will put one together too. But you put yours together as fast as you can. Do you have any questions? Okay. Here's your puzzle."

While the subject was working on puzzle 1, the experimenter assembled puzzle 2, left it in view for 10 seconds, disassembled it, left the pieces in view for 20 seconds, and reassembled it. She continued this procedure until the subject finished the puzzle or until the 90-second time limit had elapsed. She then covered the disassembled pieces of puzzle 2 with her hand, placed it in front of the subject, and said:

> "Here is another puzzle to put together as quickly as you can. Do it as fast as you can. Do you have any questions? Okay, here's your puzzle."

The experimenter watched passively while the subject assembled puzzle 2.

Experimenter 2 recorded the child's puzzle performance. Performance was later scored according to the procedure used by Achenbach and Weisz (1975). One point was awarded for each piece correctly placed within the 90-second time limit, one extra point for putting all the pieces together, two bonus points for completing the puzzle within 20 seconds, and one bonus point for completing it in 21-40 seconds. The total score for each puzzle could thus range from 0 to 7 points.

During the puzzle tasks Experimenter 1, stationed behind a one-way window, recorded the child's verbalizations, glances at the experimenter, and glances at the experimenter's puzzle. Evidence from Ruble and Nakamara (1972) and Achenbach and Weisz (1975) indicates that glances at the experimenter's puzzle in such a situation represents, in part, an adaptive, information-seeking response that is correlated with subsequent problem-solving success. However, it may also be regarded as maladaptive in the sense that it undermines the child's attentiveness to his own puzzle. So, while glances at the experimenters' puzzle were included to provide additional information about the children's behavior, no specific predictions were advanced with regard to the measure. Glances at the experimenter and verbalizations were regarded as measures of the child's social orientation.

Glances at the experimenter, during puzzle assembly, have been interpreted similarly by Achenbach and Weisz (1975), who used the label "outerdirectedness," and by Ruble and Nakamura (1972), who used the label "social orientation." Frequency of glancing at the experimenter in this situation has been shown to be significantly related to field dependence (Ruble & Nakamura, 1972), several indices of dependency upon adults (Beller, Adler, Newcomer & Young, 1972; Walters & Parke, 1964), and IQ loss over a six-month period (Achenbach & Weisz, 1975). Verbalizing, used by Gewirtz (1954) in a study of attention-seeking behavior, was employed in the present experiment as a second index of social orientation, because of evidence that most speech in children, even the category termed "egocentric" by Piaget (1923), is social in intent (cf. Piaget, 1962; Vygotsky, 1962). An additional observer was stationed behind the one-way window during the puzzle assembly tasks for ten children, independently recording the three behaviors recorded by Experimenter 1. For all three measures the inter-observer correlation exceeded .92.

Following the puzzle tasks, RP children were praised enthusiastically and presented with the Good Player Award. The NRP children were all tested before RP children, to reduce the possibility of reward expectancy on their part; they received the same procedure the RP children were to receive, except that there was no mention of a prize until the puzzle tasks had been completed by all NRP children. At that point each child was seen individually by Experimenter 1, who presented the child with the Good Player Award, saying that the child had "won this prize for doing the puzzles with my friend." Because the puzzle session required less than 15 minutes per child, all NRP children within each class were tested within the same day, thus, each child received the Good Player Award on the same day the puzzle tasks were completed.

About one week after the last child completed the puzzle tasks, the children's intrinsic interest in puzzles was again assessed via five daily, unobtrusive observations of free play activity. The same procedure used for baseline observations was employed, except that six puzzles not previously used were placed around the hexagonal table.

## Results

The first analysis tested the prediction that children promised a reward would verbalize and glance at the experimenter more than children not promised a reward. Fisher's exact tests were performed on 2 x 2 tables formed via median splits on number of verbalizations and number of glances. The resulting table of RP vs. NRP by 0 vs. 1 or more verbalizations supported the prediction ($p = .046$, one-tailed) with regard to verbalizations. The prediction regarding glances at the experimenter was also supported, by means of a RP vs. NRP by 0-2 vs. 3 or more glances at the experimenter ($p = .041$, one-tailed). In addition, children from the RP condition made fewer glances at the experimenter's puzzle (an information-seeking response) than did children in the NRP condition, but the group difference fell short of significance ($p > .15$). Content analyses of the verbalizations were undertaken in an effort to assess possible treatment group differences. The brief sessions produced relatively small numbers of verbalizations (range: 0-6), and, while the RP group had a higher proportion of help-seeking and self-evaluative (usually negative, e.g., "I'm not good at puzzles.") comments than the NRP group, no group differences approaching significance were found.

To determine whether the children's interest in puzzles was undermined by the promise of reward, an analysis was performed on the proportion of time spent with puzzles during the post-experimental observations. The proportion was log transformed $[X' = \log (X + 1)]$ to correct for a tendency toward proportionality of

group means and standard deviations (cf. Lepper et al., 1973). While the NRP-group had higher proportions of puzzle play than the RP group, the difference in log-transformed scores did not attain significance ($t < 1$). The RP group also scored nonsignificantly lower than the NRP group with respect to performance on puzzles 1 and 2 combined (and on the two puzzles separately; all three $t$s < .5).

The next analysis tested the prediction that among children in the RP group, glancing at the experimenter and verbalizing would be inversely related to performance and subsequent interest. As Table 1 indicates, the prediction was partially supported. Among RP subjects the point biserial correlation between glancing (split at the median) and puzzle score (puzzles 1 and 2 combined) was -.469 ($p < .10$), and the point biserial correlation between glancing and subsequent interest (i.e., log-transformed, post-experimental puzzle play) was -.074 (n.s.). The point biserial correlation between verbalizations (split at the median) and puzzle score was -.644 ($p < .05$), and the point biserial correlation between verbalizations and subsequent interest was -.543 ($p = .054$). The corresponding correlations for NRP subjects, all nonsignificant, are shown in Table 1 below the diagonal.

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Insert Table 1 about here

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The table provides other useful information. The significant correlations between glancing and verbalizing provide support for the view that the two variables reflect a similar process within the child (e.g., social orientation). The substantial correlations within both treatment groups between puzzle performance and subsequent interest should be interpreted in the light of the correlations between puzzle performance and <u>baseline</u> interest levels. Following the general strategy used in analysis of cross-lagged panel-correlations, if we find low

correlations between performance and baseline interest levels we might conclude either that subsequent interest was affected by success on the experimental puzzles or that both variables were similarly affected by a third factor. If we find, instead, that correlations between performance and baseline interest levels resemble correlations between performance and subsequent interest levels, then we might conclude (among other possibilities), that performance on the experimental puzzles was a positive function of children's level of interest in (and concomitant experience with) puzzles outside of the experimental setting. While there is little support for the latter position, the data offer a rather puzzling form of support for the former. Among RP children, baseline interest and puzzle scores were correlated -.425 ($p = .057$); the corresponding figure for NRP children was -.081 (n.s.). This may indicate that the offer of reward had adverse effects on children's performance as a negative function of their initial level of interest,[4] but that in both RP and NRP conditions either, (a) level of performance influenced subsequent interest, or (b) a third factor influenced performance and subsequent interest in similar ways (more about this issue in the Discussion, which follows).

## Discussion

The results of this study provide support for the two-part hypothesis advanced at the outset. The hypothesis that a child's social orientation is heightened when an adult offers the child a reward, was supported by the finding that both glancing at the adult and verbalizing were more frequent among children promised a reward than among children to whom reward had not been mentioned. The hypothesis that a reward-induced heightening of social orientation would adversely affect performance on, and subsequent interest in the task itself, was partially supported by significant negative-correlations within the RP group

between verbalizing and both puzzle performance and subsequent interest in puzzles. The marginally significant negative correlation between glancing and puzzle performance lent further support to the hypothesis.

The fact that treatment group differences in puzzle performance and in subsequent interest were nonsignificant bears discussion in the light of earlier research. The absence of significant RP-NRP differences in subsequent puzzle interest may well be explainable by reference to the relatively low level of interest in puzzles shown by most of the children during baseline measurement. Lepper et al. (1973) found that interest in drawing declined least (as a function of anticipated reward) among subjects showing relatively low baseline interest levels. The baseline level of interest in puzzles shown by most of the children in the present study was relatively low (mean percentage of baseline time spent with puzzles: 5.78), and the minimum level of interest accepted was lower than the standard set by Lepper et al. Arguing against the initial interest explanation is the fact that within the RP group initial and subsequent interest were not significantly correlated, but this could have been caused by restricted ranges on the interest measures. Useful information might be generated by research like the present investigation, employing a very high-interest activity. The absence of significant RP-NRP differences in quality of puzzle performance is one more addition to the very mixed literature on effects of rewards on performance (see Condry, in press; McGraw & McCullers, 1975). In the published experiment that is perhaps most similar to the present study procedurally, Lepper and Greene (1975) found that children in a reward condition were more successful at puzzle assembly than control children, at a borderline level of significance; however, there the reward was described as contingent upon performance quality, so comparison with the present study is strained at best. In fact, in research on

both performance quality and intrinsic interest the primary objective should be to unearth the processes which underlie adverse effects of reward procedures, when such effects do occur; it is to this issue that the present study speaks most directly.

The findings support the view that rewards have adverse effects on performance and intrinsic interest to the extent that they activate the child's social orientation. While the mere presence of an adult may have this effect, evidently the prospect of reward serves to exacerbate it, since it was only in the reward condition that social orientation (indexed by verbalizations) was significantly correlated with performance and subsequent interest. While this feature of the data may be partly due to the NRP group's more restricted range (associated with their lower means) on the measures of social orientation, it may also be that the social gestures--e.g., verbalizations--of the RP group differ in nature from those of the NRP group. While content analysis showed no significant surface differences, it may be that the verbalizations (and perhaps the glances) of a child working in the presence of an adult empowered to dispense rewards tend to differ in their underlying motivation or intent from those of children not induced to view the adult as a source of reward.

This brings us to the question of theoretical implications. Does the heightened social orientation of the child who anticipates reward reflect a reattribution by the child regarding his or her task performance. As suggested in the introduction, glancing and verbalizing might reflect a causal attribution, not to the reward itself, but to the agent of reward--e.g., "I am performing the task for this adult (to whom I am obligated/or, upon whom I am dependent)." Should the reattribution take this form,one might imagine procedures for making rewards more effective by enhancing the child's sense of "internal locus of control."

As was implied in the introduction, one might construe the findings of this study as resulting from competing responses. Glancing and verbalizing are overt responses which might compete directly with both attention to and enjoyment of puzzle assembly. Or, at a deeper level of analysis, these social responses might reflect feelings of obligation or dependency which compete with attention to and enjoyment of the task. The present findings would leave the causal relations in such competing response interpretations to conjecture and future research. Do reward procedures influence social orientation, which in turn provokes responses incompatible with task attention and enjoyment? Or do the social responses lead to poor performance, which in turn undermines enjoyment and subsequent interest? The correlational analyses discussed in the Results section can only suggest possibilities.

One might ask what the present findings mean in the light of research which shows adverse effects of rewards in the absence of the rewarding person. There are two possibilities worth considering. One is that adverse effects of rewards may be mediated by a number of factors, only one of which is social orientation. A second is that glancing and verbalizing in the presence of a reward-agent are merely outward expressions of an internal state (an attribution, or distracting feelings or thoughts, as discussed above) that accompanies the prospect of receiving a reward from someone else, regardless of whether that person is physically present.

Yet, the situation in which another is present is of particular interest because of an intriguing review of "social facilitation" effects, by Zajonc (1965). Drawing from research findings spanning 50 years, Zajonc has concluded that the presence of other people has a <u>negative</u> effect on the ability to develop a poorly learned skill. The present research may represent a modest step toward answering the question, "Why?"

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Footnotes

1. Sincere thanks are extended to Blair Glennon, Gail Hogan, Chin Lan Tsai, and the staff of the Cornell Nursery School for their assistance in the conduct of this research. The study was supported by a research grant from the College of Human Ecology, Cornell University.
2. In Deci's studies, and other research with subjects older than young children, undermining effects appear most often following rewards that are contingent upon quality of performance. Noncontingent anticipated rewards generally have not been shown to undermine intrinsic interest in older children and adults.
3. In fact, without specifying what aspect(s) of social interaction one might focus upon, Lepper and Greene (1975) did acknowledge that future research should examine "the effects of face-to-face monitoring, which may depend heavily on the character of the interaction between the agent and the object of surveillance" (p. 484).
4. The careful reader of Lepper, et al. (1973) might be interested to know that the correlations between baseline and subsequent interest were low and nonsignificant in both RP and NRP groups.

Table 1

Correlations Among Principal Dependent Variables

| Variable | Glances at E | Verbalizations | Puzzle Score | Interest |
|---|---|---|---|---|
| Glances at E | | .410@ | -.469@ | -.074 |
| Verbalizations | .478* | | -.644* | -.543* |
| Puzzle Score | .027 | -.113 | | .418@ |
| Interst | -.434 | -.455 | .481* | |

Note: Coefficients above the diagonal are for the RP group (N=15); those below the diagonal are for the NRP group (N=14). The correlations of interest with puzzle score, and of glances with verbalizations are Pearson coefficients based on log transformed [$X' = \log (X + 1)$] interest, glancing, and verbalization measures. A meaningful phi coefficient could not be obtained for the latter two measures because some expected cell frequencies were less than 5; both measures showed positive skew and proportionality of means and standard deviations, and, of the data transformations discussed in Winer (1971) the log transformation afforded the best mitigation of these problems. The correlations of glances and verbalizations with puzzle score and interest are point biserial coefficients based on median splits of the glancing and verbalizing scores.

@ $p \leq .10$

* $p \leq .05$